



Test oscillator of voltage fluctuations,  
harmonics, inter harmonics  
and frequency changes  
IGU 16.1

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## 1 Product features

1.1 Test oscillator of voltage fluctuations, harmonics, inter harmonics and frequency (hereinafter – test oscillator IGU 16.1) is manufactured by "PRORYV" Research and development enterprise.

1.2 Test oscillator IGU 16.1 is designed to generate a specified voltage fluctuations changes value, voltage frequency, harmonics, and interharmonics changes at 220 V; 50 Hz circuits when making tests of technical equipments (hereinafter - TE) in compliance with GOST R 51317.4.14-00, IEC 61000-4-14-99, GOST R 51317.4.28-00, IEC 61000-4-28-99, IEC 36417.4.1-01, IEC 61000-4-13-99, GOST 30804.4.11-2013 and IEC 61000-4-11-99 to the extent applicable to gradual voltage change, GOST R 50009-00 (UK 5) and NPB 57-97 Table 4.

Note: The manufacturer reserves the right to make alterations in the construction and instruction manuals that do not affect performance specifications.

## 2 Technical specifications

- nominal current drawn by a TE from mains 220 V; 50 Hz 8 A max<sub>rms current</sub>
- maximum short-term current drawn by a TE 16 A max<sub>rms current</sub>
- peak current drawn by a TE 60 A max
- voltage measurement range (0 — 280) V<sub>rms voltage</sub>
- voltage measurement accuracy 0.3% max
- voltage measurement channel input resistance "Input U (Вход U)" 500 kW min
- current measurement range (0 — 35) A<sub>rms current</sub>
- current measurement accuracy 1% max
- current measurement channel input resistance "Input I (Вход I)" 0.01 O max

### In a mode as indicated in GOST R 51317.4.14-00:

- nominal output voltage (Un) 220 V ± 1%
- output voltage change range (0.75 — 1.2) Un
- output voltage frequency 50 Hz ± 0.2%
- surge of output voltage 5% max from voltage change value
- duration of voltage changes 2 sec ± 10%
- voltage change period 5 sec ± 10%
- voltage change rise and fall time 0.1 sec ± 1%

### In a mode as indicated in GOST R 51317.4.28-00:

- nominal output voltage (Un) 220 B ± 2%
- frequency change range (42.5 – 57.5) Hz
- frequency setting error ± 0.3%
- time length setting error ± 10%

### In a mode as indicated in OST 36417.4.1-01:

- nominal output voltage (Un) 220 V ± 1%
- output voltage fundamental harmonic frequency 50 Hz ± 0.2%
- output voltage harmonic composition in compliance with GOST 30804.3.2-2013
- generated harmonic and inter harmonic frequency range (16.67-2000) Hz
- generated harmonic and inter harmonic voltage (0-14) % Un
- generated harmonic and inter harmonic voltage setting error 5% max from set harmonic voltage
- phase shift for certain harmonics compared with the fundamental harmonic 0°,180°



**In a mode as indicated in GOST 30804.4.11-2013:**

- nominal output voltage ( $U_n$ ) 220 V  $\pm$  1%
- output voltage change range (0 — 1)  $U_n$

**In a mode as indicated in GOST R 50009-00 (UK 5) and NPB 57-97 Table 4:**

- nominal output voltage ( $U_n$ ) 220 V  $\pm$  1%
- output voltage fundamental harmonic frequency 50 Hz  $\pm$  0.2%
- generated harmonic frequency range (100-5000) Hz
- amplitude of distorting signal 10,20,35 V  $\pm$  5%

- import power 3,5 kW max
- dimensions 520 x 505 x 165 mm
- device mass 30 kg max
- service life 5 years

### 3 Packing Contents

The package includes:

- test oscillator IGU 16.1 1 unit
- mains cable 1 unit
- technical passport 1 unit
- operator's manual 1 unit
- Laptop 1 unit



## 4 Feature and operation concept

4.1 The functional chart of the test oscillator IGU 16.1 is shown in Figure 1.

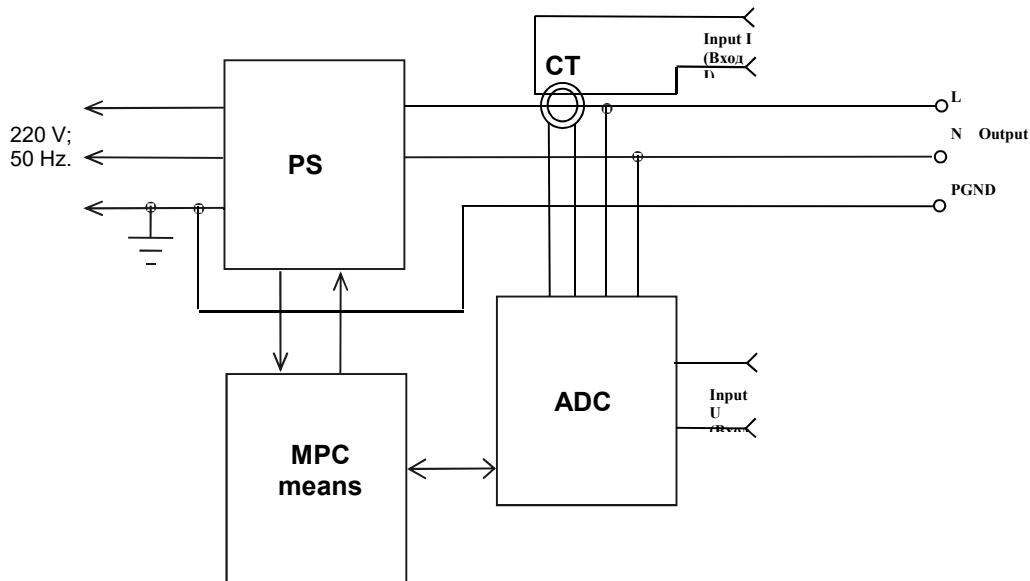


Figure 1 The functional chart of the oscillator IGU 16.1

1. Power source (PS)
2. Means for measurement, processing and control (MPC means)
3. Analog-Digital Converter (ADC)
4. Current transducer (CT)

4.2 The power source (PS) generates output AC and DC voltage required for other units of the oscillator to operate. PS has overcurrent, short-circuit and overheating protection devices. A power coefficient corrector forming a part of the PS adjusts a phase shift between input current and voltage, as a result input  $\cos \varphi$  is to be maintained 0.95 minimum at a different load pattern. **When connecting a testing equipment and external meters to the oscillator IGU 16.1 output, it is necessary to take account of voltage, existing at the oscillator output between the neutral and ground wires, that equals to a half of the oscillator output voltage. In fact, the output voltage of the oscillator can be considered as a differential in relation to the ground wire.**

4.3 Means for measurement, processing and control (MPC means) controls the other units of the oscillator, processes ADC data, and collects and displays the information on the monitor and printing device.

4.4 The Analog-Digital converter (ADC) is designed to convert output voltage and current signals to a digital one for further processing. The sampling frequency is 12800 Hz.

## 5 Safety precautions

5.1 Only persons who have read and understood "The rules of technical operation of electric installations of consumers", have an approved group-based electrical safe work practices (not less than level 3), have been instructed on safety measures for work with electronic test equipment, and have examined technical specification and the manual, are permitted to use the test oscillator.

5.2 The repair of the oscillator shall be done only by the manufacturer's representatives.

**5.3 *It is required to make a protective ground connection to the appropriate contact of the ground outlet.***

## 6 Preliminary starting procedure

6.1 After transfers in winter or high humidity conditions, the product should be kept under normal conditions 12 hours minimum before using.

6.2 Set up a socket to plug in the oscillator to the mains and connect it to the power shield through wires having 2.5 mm<sup>2</sup> sections minimum.

6.3 Connect the laptop to the USB connector on the rear panel of the oscillator IGU 16.1.

6.4 Connect the power cable to the socket on the rear panel and to the power outlet 220 V ; 50 Hz. Turn on the test oscillator by "**POWER**" button, and the green led on the front panel of the oscillator should be lit. Turn on the laptop and run the IGU16 software.

6.5 The phase and the zero in the "**OUTPUT**" socket correspond to "**L**" and "**0**" signs on the front panel.



## 7 Working sequence

7.1 It is recommended that the tests be carried out 5-10 minutes after the oscillator is turned on.

7.2. The working sequence with the oscillator IGU 16.1 software is described in the "Operator's manual", which is included in the generator's supply package.

**7.3 When connecting a testing equipment and external meters to the oscillator IGU 16.1 output, it is necessary to take account of voltage, existing at the oscillator output between the neutral and ground wires, that equals to a half of the oscillator output voltage. In fact, the output voltage of the oscillator can be considered as a differential in relation to the ground wire. Therefore, the connection of zero and ground wires at the outlet will be considered as a short circuit by the oscillator.**

7.4 After the work is completed, the power of a technical equipment shall be switched off, the test oscillator is powered off and the technical equipment is disconnected from the oscillator "OUTPUT" socket.

## 8 Maintenance

8.1 The maintenance of the test oscillator after the end of the warranty period shall be performed by the manufacturer under a particular contract.

8.2 The manufacturer shall provide warranty service for the oscillator over 24 months after work acceptance is made in accordance with the contract.

8.3 The warranty obligations shall not apply to equipment with clear mechanical or other damage caused by malfunctioning, mistreatment or accidents.

8.4 The warranty period is terminated if the repair is to be completed by the Customer or any third party.

8.5 Triennially at a minimum, the test oscillator shall be checked in accordance with periodical qualification procedure.

## 9 Problems and solutions

9.1 Possible problems of a laptop and solutions of fixing them are indicated in their manuals.

9.2 If there is power supply or ADC failure, the system stops and a corresponding message is shown. In this case, it is required to stop working with the oscillator, turn it off, and report to the manufacturer.

9.3 Otherwise, contact the manufacturer.

